

## PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

## Improvements in or Relating to Treatment of Human Hair

We, THE GILLETTE COMPANY, a corporation organised under the laws of the State of Delaware, United States of America, of 15, West First Street, Boston, Massachusetts, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a method of improving the appearance of human hair, particularly hair which is yellowish, gray, or dulled from natural influences or over-subjection to cosmetic treatments, as bleaching, and embraces compositions used in the practice of the method.

It has been heretofore proposed to brighten and generally reduce the unsightliness of such hair by treatment thereof with fluorescent materials or "optical dyes", contained in shampoos, hair dressings and the like. These attempts have met with only minor success, because what little improvement is achieved may be largely lost even from subsequent simple wetting of the treated hair to facilitate the combing thereof and, in any event, is so fugitive as to necessitate treatment of the hair with the dye-containing preparation at abnormally frequent intervals.

There is described in prior Specification No. 686,805 a detergent composition comprising *inter alia*, sodium perborate and a fluorescent brightening compound for use in washing cotton at the boil. In prior Specification No. 637,140 there is described a process for bleaching wool by treating it with an alcoholic solution of hydrogen peroxide followed by rinsing with a solution containing an optical bleaching dye.

This invention aims to increase the life of the effects obtainable by means of fluorescent materials applicable to human hair.

A further object is to provide a process

(and compositions for use in the practice thereof) whereby human hair may be brightened with fluorescent materials as an incident of the cold permanent waving of the hair.

It is now conventional to "cold wave" human hair by a procedure in accordance with which the hair, before and after being wound on curling rods, is treated with an aqueous composition capable of rendering the hair plastic through reduction of the disulfide bonds in the hair keratin. These bonds are subsequently restored, with setting of the hair in the configuration determined by the curling rods, through application to the plasticized hair of a so-called "neutralizing solution", ordinarily an aqueous solution of sodium perborate or sodium bromate, such solution being applied in increments with intervening working periods of from 5 to 15 minutes, the last increment being applied after the hair has been unwound from the curling rods.

Recently, a process was developed differing from the conventional procedure particularly in that the use of a neutralizing solution is not essential. Such process is described in detail in our co-pending application No. 11134/52 (Serial No. 735,303). Suffice it to say here that in the execution thereof in the preferred manner, the hair following a predetermined period of processing with the waving solution, this period being shorter than normal, is water-rinsed and allowed to go to substantial dryness while still wound on the curlers, the disulfide linkages being restored by simple aerial oxidation. Whenever a neutralizing solution is employed in this process, application thereof is delayed until substantial aerial oxidation of the hair has occurred on the curlers.

Waving processes of the type just described are so simple in execution as to make possible their use in the home. Thus,

(Price 3s.0d.)

Price 4s. 6d.

everyone is familiar with the so-called "home wave kits", so widely available. Such a kit contains, together with the necessary curling rods, a bottle of waving lotion comprising the hair plasticizing or reducing chemical and, where the process to be practiced using the kit calls for the employment of a neutralizing solution, further includes an envelope containing a quantity of sodium perborate, for instance, sufficient to make up the required amount of solution.

All of the foregoing is submitted, of course, by way of background to the end that the invention herein will be fully understood.

The present invention is based on the discovery that when a fluorescent material is applied to hair rendered plastic by means of hair-reducing compositions, such as are employed in cold waving, the hair upon subsequent restoration of the disulfide linkages, whether through aerial oxidation or through the use of a neutralizing solution, is peculiarly retentive of the fluorescent material, apparently by reason of deeper penetration of the fluorescent material into the plasticized hair fibers. Thus, even after repeated shampooing, hair treated according to the invention still fluoresces markedly.

Proceeding according to the invention the fluorescent compound may be applied to the hair simultaneously with the reducing chemical or at any later stage before the deplasticization or fixing of the hair is complete.

Although our invention in its preferred embodiment involves the brightening of the hair as an incident of the cold permanent waving thereof, the improvement it provides is also attainable in large measure using low strength solutions of hair-reducing chemicals essentially inoperable in hair waving. Accordingly, the invention may be used by individuals not desiring a permanent wave or by individuals having naturally curly hair—in the latter case without adverse effect on the natural curls.

A large number of fluorescent compounds are applicable to the invention. Most of these are derivatives of cumarin or stilbene, but certain derivatives of diphenyl imidazolone can also be employed. The fluorescent compound must be water-soluble in the concentrations in which it is used and, under the conditions of its use, must not be substantially reactive with the reducing chemical—or with the chemical used to neutralize the reduced hair, if such a chemical is employed. As typical of readily available commercial preparations which provide generally satisfactory results may be mentioned: Uvitex WS, Ciba; Tinopal WR, Extra, Geigy; Tinopal BVA, Geigy; and Blancophor WT, General Dyestuff, in the concentrations employed in the waving

lotions of the present invention. These lotions do not impart any undesirable coloration to the hair. The words "Uvitex", "Tinopal" and "Blancophor" are registered Trade Marks.

In the practical application of our invention with respect to home wave kits, the selected fluorescent compound may be incorporated as a component of the lotion or in the envelope with the neutralizer compound, when such a compound is included in the kit. Alternatively, the fluorescent compound may be included in the kit as a separate item, in the form of a capsule, for example, to be subsequently added to the lotion or neutralizer solution, or used in the preparation of a separate solution.

When the compound is present in the waving solution or the lotion at the time of application of the latter to the hair, it is available for penetration of the hair fibers during all stages of the reduction—a marked advantage. Moreover, uniform distribution of the compound throughout the tresses is easily achieved because of application of the lotion to the straight unwrapped tress before winding, as well as to the wrapped tress during re-saturation after winding. For these reasons, it is preferred that the fluorescent compound be made a component of the lotion either at the point of manufacture of the lotion or by the user of the kit.

The concentration of the fluorescent compound, whether included in the waving lotion or in the neutralizing solution or applied as a separate solution, may vary within substantial limits, the upper limit being frequently determined by its solubility. When made a component of the lotion its effects may be noticeable at a concentration as low as 0.05%. Usually, the compound is employed in amounts providing a concentration of from about 0.1 to 2.5%—from 0.1 to 1.0% being considered optimum. Our invention contemplates the use of a solubilizing and/or stabilizing agent with the fluorescent compound when necessary or desirable.

In many instances, hair treated according to the invention is not only brightened, but has an improved "hand" or "feel". Additionally, the treated hair frequently shows improvement in the respect of lustre.

Our invention is not limited to the use of any particular hair-reducing chemical, but we prefer to employ an aqueous alkaline mercaptan solution. Especially good results have been achieved using an alkaline solution in which the hair-reducing chemical is ammonium thioglycolate. In lieu of a mercaptan we may employ, for example, an aqueous sulfite or bisulfite solution.

The detailed practice of our invention in its method aspect is illustrated by the following specific examples, which are not to

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be taken as in any way limitative :

**Example 1**

Discoloured gray hair is shampooed, blotted, and waved with an ammonium thioglycolate lotion, 0.7 Normal in respect of thioglycolic acid and 0.5 Normal in respect of excess free ammonia, for 30 minutes, after which the hair is neutralized in the conventional manner over a period of 20 minutes with a solution prepared by dissolving 4.8 grams of sodium perborate monohydrate, 1.5 grams of sodium hexametaphosphate, and 2.3 grams of Uvitex WS in a pint of water. The treated hair is noticeably whiter than a control tress similarly treated but without the use of a fluorescent material. Also the treated hair has a softer hand and appears more lustrous than the control tress in daylight. These effects hold for a period of time much longer than normally experienced.

**Example 2**

Hair with a yellowish tinge is shampooed, towel-blotted, and waved with an ammonium thioglycolate lotion, 0.5 Normal in respect of thioglycolic acid and 0.5 Normal in respect of excess free ammonia, for 90 minutes. The hair is then neutralized in the conventional manner with a composition made up by dissolving 11.9 grams of potassium bromate and 4.7 grams of Uvitex WS in a pint of water. The treated hair is whiter than the control tress in daylight and does not display the unsightly yellowish cast. The effect holds through repeated shampooing.

**Example 3**

Discolored hair (yellowish, almost a green cast) is shampooed, towel-blotted, parted into sections, and wrapped on plastic curlers after saturation with a cold waving lotion. The lotion is 0.5 Normal in ammonium thioglycolate and 0.48 Normal in excess ammonia, and contains 0.15% of Uvitex WS dissolved in the lotion a few minutes prior to use. After re-saturation with lotion, the wrapped hair is allowed to process for 90 minutes, and is then neutralized with sodium perborate solution. The results are superior to those obtained in the first two experiments.

**Example 4**

Gray hair tresses are shampooed, towel-blotted, and wrapped on plastic curlers after saturation with a cold waving lotion. The lotion is 0.7 Normal in ammonium thioglycolate, 0.8 Normal in ammonium sulfite, and 0.6 Normal in free ammonia, and contains 0.5% Uvitex WS which is dissolved in it a few minutes before use. Some of the tresses are re-saturated with lotion and allowed to process for 90 minutes, after which they are neutralized with sodium perborate solutions in the usual manner. Other tresses are re-saturated with lotion,

allowed to process for 30 minutes, rinsed thoroughly with water, allowed to remain on the rods for about 4 hours, unwrapped, pin curled into the desired style and allowed to dry. Control tresses are waved with a 0.70 lotion of the same composition containing no Uvitex WS. These control tresses are more yellowish and less silvery than the tresses treated with the Uvitex WS composition, and the advantage in appearance of the 0.75 latter tresses is obvious. The same advantageous affects are discernable after five shampoos. Addition of the fluorescent dye has no effect on the strength of the reducing components of the lotion during the period 80 of use, and desirable waves are produced in all cases.

**Example 5**

Discolored gray hair tresses are waved by the processes of Example 4 with a cold 85 waving lotion containing 0.6 Normal ammonium thioglycolate, 0.8 Normal ammonium carbonate, 0.33 Normal free ammonia, and 0.3% Uvitex WS. The desirable effects obtained are comparable to those noted in 90 Example 3.

**Example 6**

Discolored gray hair tresses are waved by the processes of Example 4 with a cold 95 waving lotion containing 0.6 Normal ammonium thioglycolate and 1.6 Normal ammonium carbonate adjusted with 28% ammonium hydroxide so that the total ammonia normality is 1.95 Normal. The lotion contained 0.1% Uvitex WS. The desirable 100 effects obtained are comparable to those noted in Example 3.

**Example 7**

Tresses of dark gray hair containing brown streaks which have a greenish cast 105 are waved by the processes of Example 4 with a cold waving lotion containing 0.7 Normal ammonium thioglycolate, 0.8 Normal ammonium sulfite, 0.3 Normal ammonium carbonate, 0.6 Normal free ammonia, 110 and 0.5% Uvitex WS. The treated tresses are brighter, whiter, and have lost the greenish cast.

What we claim is :—

1. Process for treating human hair which 115 comprises applying thereto an agent for splitting the disulfide bonds in the hair keratin to render the hair plastic and an essentially colorless fluorescent compound substantially inert to said agent.

2. Process according to claim 1, in which said agent and said fluorescent compound are applied to the hair simultaneously.

3. Process according to claim 1, in which said fluorescent compound is applied to the 125 hair in its plastic condition subsequent to the application of said agent.

4. Process according to any one of the preceding claims, wherein subsequently to applying said agent for splitting the disulfide 130

bonds, a composition comprising a neutralizer is applied to the hair to restore said disulfide bonds, said fluorescent compound being substantially inert to said agent and to 5 said neutralizer.

5. Process according to claim 4, except as claim 4 is appendant upon claim 2, in which the neutralizer and said fluorescent compound are applied to the hair simultaneously.

10. A composition for treating human hair comprising an agent for splitting the disulfide bonds in hair keratin to render the hair plastic and a fluorescent compound 15 substantially inert to said agent.

15. A composition for treating human hair in which the disulfide bonds in the hair

keratin have been split to render the hair plastic comprising a neutralizer to restore said disulfide bonds in a concentration suitable for the treatment of human hair and an essentially colorless fluorescent compound inert to said neutralizer. 20

8. The process for treating human hair substantially as hereinbefore described with reference to the examples. 25

9. The compositions for treating human hair substantially as hereinbefore described, and including an essentially colorless fluorescent compound. 30

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